

Fig. 1

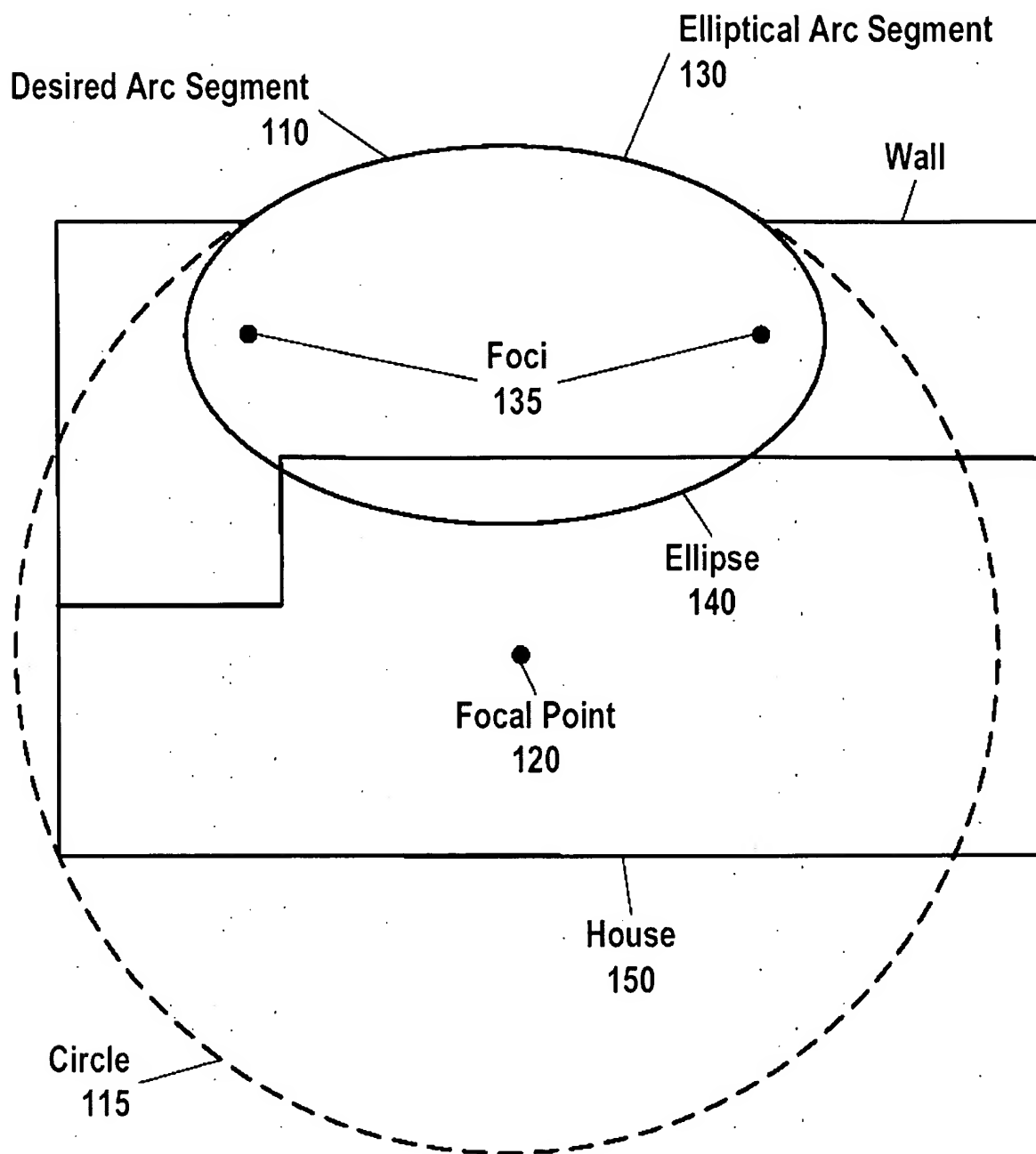


Fig. 2

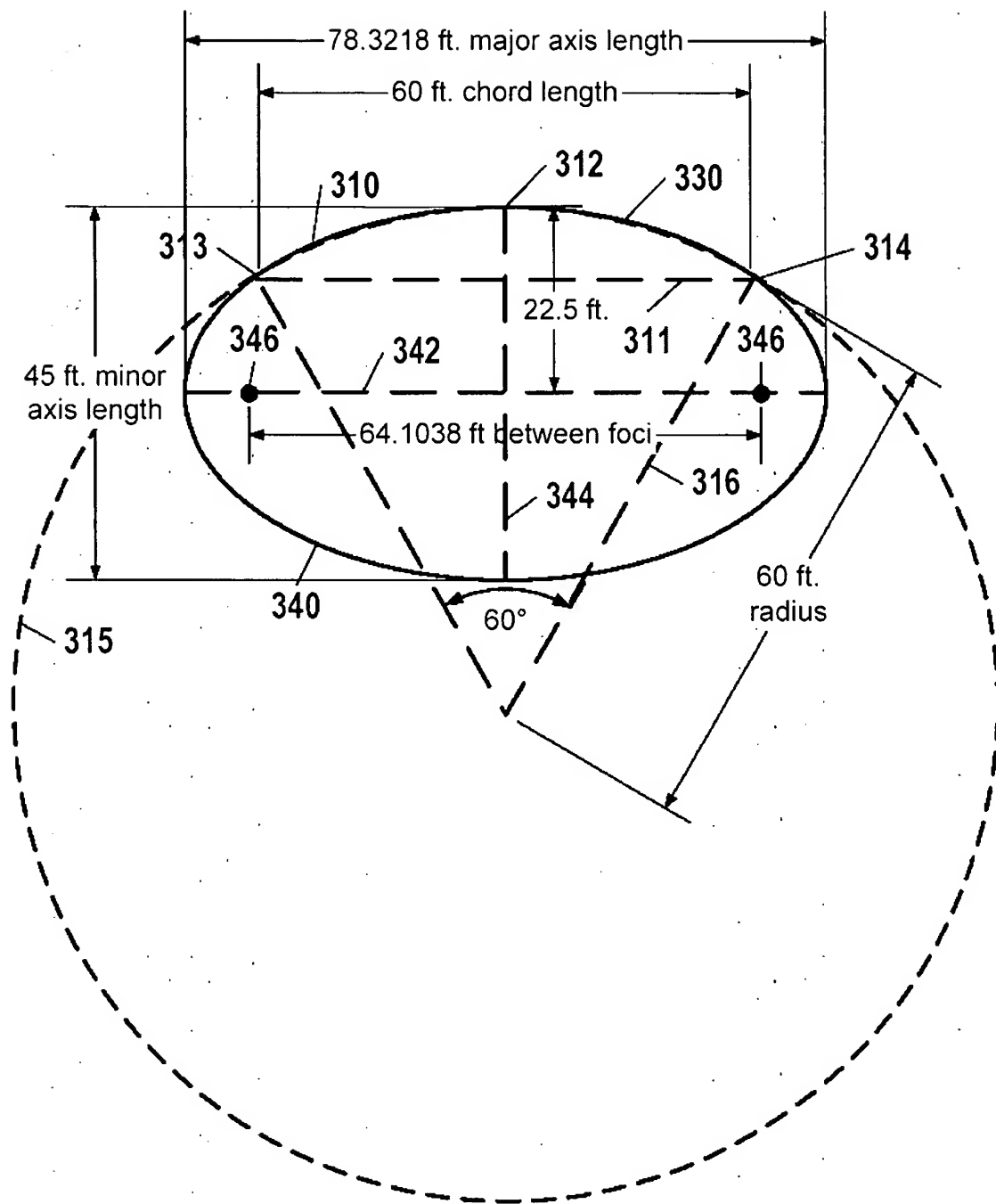


Fig. 3

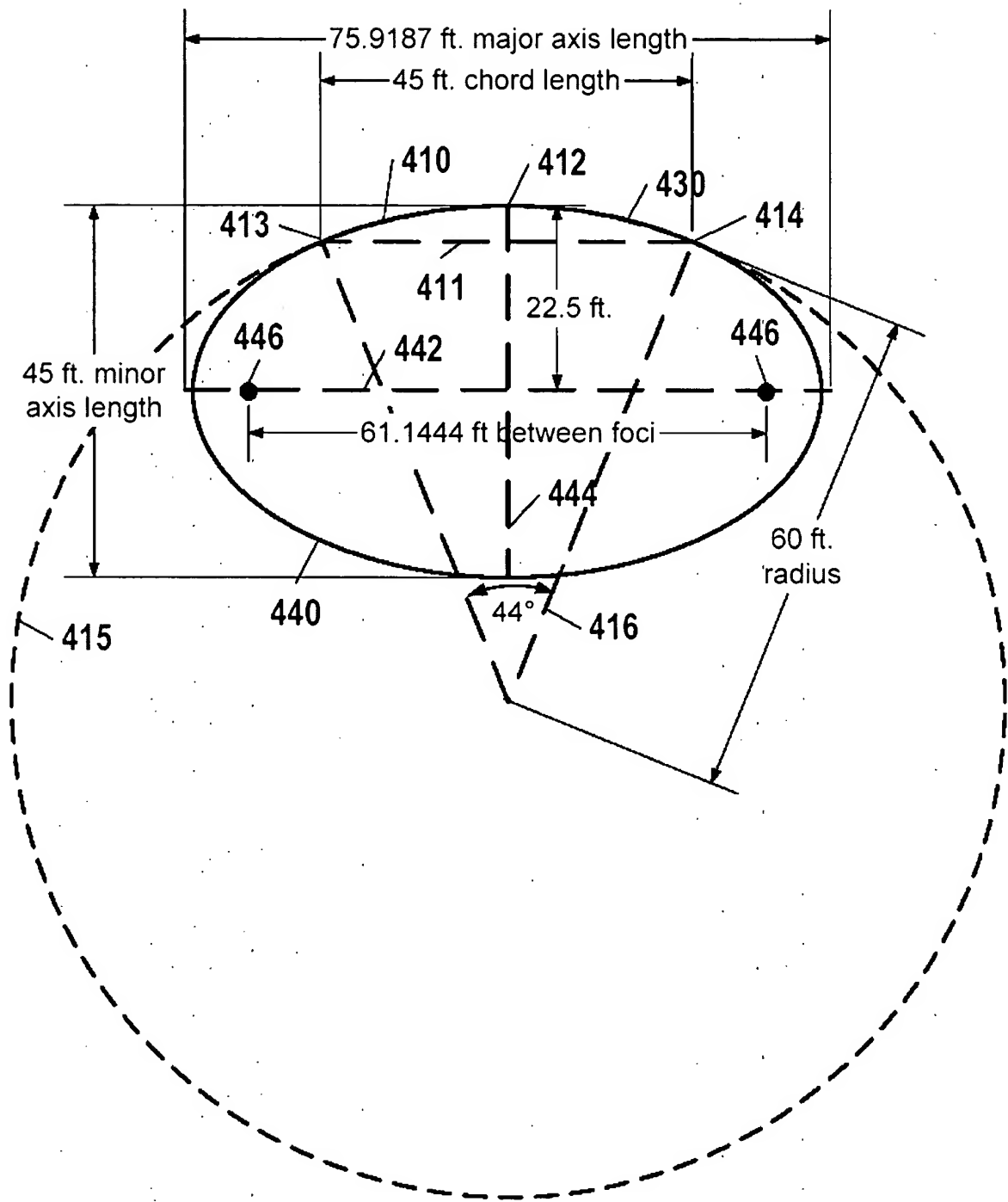


Fig. 4

# **ELLIPTICAL COORDINATES ASSUMING CHORD LENGTH EQUALS THE RADIUS**

Desired arc coordinates		Close fit elliptical coordinates			Accuracy	
radius of circle of which arc is segment	chord length	Distance from arc midpoint to baseline	Stringline length	Baseline length	+/- 64ths	+/- inches
5	5	1.875	6.5268165	5.341987797	8.73	0.14
6	6	2.25	7.8321798	6.410385357	10.47	0.16
7	7	2.625	9.1375431	7.478782916	12.22	0.19
8	8	3	10.4429064	8.547180475	13.96	0.22
9	9	3.375	11.7482697	9.615578035	15.71	0.25
10	10	3.75	13.053633	10.68397559	17.45	0.27
11	11	4.125	14.3589963	11.75237315	19.20	0.30
12	12	4.5	15.6643596	12.82077071	20.94	0.33
13	13	4.875	16.9697229	13.88916827	22.69	0.35
14	14	5.25	18.2750862	14.95756583	24.43	0.38
15	15	5.625	19.5804495	16.02596339	26.18	0.41
16	16	6	20.8858128	17.09436095	27.92	0.44
17	17	6.375	22.1911761	18.16275851	29.67	0.46
18	18	6.75	23.4965394	19.23115607	31.41	0.49
60	60	22.5	78.321798	64.10385357	104.70	1.64
100	100	37.5	130.53633	106.8397559	174.50	2.73

**Fig. 5**

# **FORMULAS USED TO COMPUTE THE ELLIPTICAL COORDINATES OF FIG. 5**

Desired arc coordinates		Close fit elliptical coordinates			Accuracy	
radius	chord length	Distance from arc midpoint to baseline	Stringline length	Baseline length	+/- 64ths	+/- inches
5	=A3	=A3*0.375	=A3*1.3053633	=2*((D3/2)^2-(C3)^2)^0.5	=A3*1.745	=F3/64
6	=A4	=A4*0.375	=A4*1.3053633	=2*((D4/2)^2-(C4)^2)^0.5	=A4*1.745	=F4/64
7	=A5	=A5*0.375	=A5*1.3053633	=2*((D5/2)^2-(C5)^2)^0.5	=A5*1.745	=F5/64
8	=A6	=A6*0.375	=A6*1.3053633	=2*((D6/2)^2-(C6)^2)^0.5	=A6*1.745	=F6/64
9	=A7	=A7*0.375	=A7*1.3053633	=2*((D7/2)^2-(C7)^2)^0.5	=A7*1.745	=F7/64
10	=A8	=A8*0.375	=A8*1.3053633	=2*((D8/2)^2-(C8)^2)^0.5	=A8*1.745	=F8/64
11	=A9	=A9*0.375	=A9*1.3053633	=2*((D9/2)^2-(C9)^2)^0.5	=A9*1.745	=F9/64
12	=A10	=A10*0.375	=A10*1.3053633	=2*((D10/2)^2-(C10)^2)^0.5	=A10*1.745	=F10/64
13	=A11	=A11*0.375	=A11*1.3053633	=2*((D11/2)^2-(C11)^2)^0.5	=A11*1.745	=F11/64
14	=A12	=A12*0.375	=A12*1.3053633	=2*((D12/2)^2-(C12)^2)^0.5	=A12*1.745	=F12/64
15	=A13	=A13*0.375	=A13*1.3053633	=2*((D13/2)^2-(C13)^2)^0.5	=A13*1.745	=F13/64
16	=A14	=A14*0.375	=A14*1.3053633	=2*((D14/2)^2-(C14)^2)^0.5	=A14*1.745	=F14/64
17	=A15	=A15*0.375	=A15*1.3053633	=2*((D15/2)^2-(C15)^2)^0.5	=A15*1.745	=F15/64
18	=A16	=A16*0.375	=A16*1.3053633	=2*((D16/2)^2-(C16)^2)^0.5	=A16*1.745	=F16/64
60	=A17	=A17*0.375	=A17*1.3053633	=2*((D17/2)^2-(C17)^2)^0.5	=A17*1.745	=F17/64
100	=A18	=A18*0.375	=A18*1.3053633	=2*((D18/2)^2-(C18)^2)^0.5	=A18*1.745	=F18/64

**Fig. 6**

**ELLIPTICAL COORDINATES ASSUMING CHORD LENGTH EQUALS 75% OF THE RADIUS**

Desired Arc Coordinates		Close Fit Elliptical Coordinates			Accuracy	
radius of circle of which arc is a segment	chord length	Distance from midpoint to baseline	Stringline length	Baseline length	+/- 64ths	+/- inches
5	3.750937734	1.875	6.326558	5.0953739	2.36	0.04
6	4.501125281	2.25	7.59187	6.1144488	2.83	0.04
7	5.251312828	2.625	8.857181	7.1335236	3.30	0.05
8	6.001500375	3	10.12249	8.1525984	3.77	0.06
9	6.751687922	3.375	11.3878	9.1716732	4.25	0.07
10	7.501875469	3.75	12.65312	10.190748	4.72	0.07
11	8.252063016	4.125	13.91843	11.209823	5.19	0.08
12	9.002250563	4.5	15.18374	12.228898	5.66	0.09
13	9.75243811	4.875	16.44905	13.247972	6.13	0.10
14	10.50262566	5.25	17.71436	14.267047	6.60	0.10
15	11.2528132	5.625	18.97967	15.286122	7.08	0.11
16	12.00300075	6	20.24499	16.305197	7.55	0.12
17	12.7531883	6.375	21.5103	17.324272	8.02	0.13
18	13.50337584	6.75	22.77561	18.343346	8.49	0.13
60	45.00112503	22.5	75.9187	61.144488	28.30	0.44
100	75.01815469	37.5	126.5312	101.90748	47.17	0.74

**Fig. 7**

**FORMULAS USED TO COMPUTE THE ELLIPTICAL COORDINATES OF FIG. 7**

Desired arc coordinates		Close fit elliptical coordinates			Accuracy	
radius	chord length	Distance from arc midpoint to baseline	Stringline length	Baseline length	+/- 64ths	+/- inches
5	=A3/1.333	=A3*0.375	=A3*1.3053633	=2*((D3/2)^2-(C3)^2)^0.5	=A3*1.745	=F3/64
6	=A4/1.333	=A4*0.375	=A4*1.3053633	=2*((D4/2)^2-(C4)^2)^0.5	=A4*1.745	=F4/64
7	=A5/1.333	=A5*0.375	=A5*1.3053633	=2*((D5/2)^2-(C5)^2)^0.5	=A5*1.745	=F5/64
8	=A6/1.333	=A6*0.375	=A6*1.3053633	=2*((D6/2)^2-(C6)^2)^0.5	=A6*1.745	=F6/64
9	=A7/1.333	=A7*0.375	=A7*1.3053633	=2*((D7/2)^2-(C7)^2)^0.5	=A7*1.745	=F7/64
10	=A8/1.333	=A8*0.375	=A8*1.3053633	=2*((D8/2)^2-(C8)^2)^0.5	=A8*1.745	=F8/64
11	=A9/1.333	=A9*0.375	=A9*1.3053633	=2*((D9/2)^2-(C9)^2)^0.5	=A9*1.745	=F9/64
12	=A10/1.333	=A10*0.375	=A10*1.3053633	=2*((D10/2)^2-(C10)^2)^0.5	=A10*1.745	=F10/64
13	=A11/1.333	=A11*0.375	=A11*1.3053633	=2*((D11/2)^2-(C11)^2)^0.5	=A11*1.745	=F11/64
14	=A12/1.333	=A12*0.375	=A12*1.3053633	=2*((D12/2)^2-(C12)^2)^0.5	=A12*1.745	=F12/64
15	=A13/1.333	=A13*0.375	=A13*1.3053633	=2*((D13/2)^2-(C13)^2)^0.5	=A13*1.745	=F13/64
16	=A14/1.333	=A14*0.375	=A14*1.3053633	=2*((D14/2)^2-(C14)^2)^0.5	=A14*1.745	=F14/64
17	=A15/1.333	=A15*0.375	=A15*1.3053633	=2*((D15/2)^2-(C15)^2)^0.5	=A15*1.745	=F15/64
18	=A16/1.333	=A16*0.375	=A16*1.3053633	=2*((D16/2)^2-(C16)^2)^0.5	=A16*1.745	=F16/64
60	=A17/1.333	=A17*0.375	=A17*1.3053633	=2*((D17/2)^2-(C17)^2)^0.5	=A17*1.745	=F17/64
100	=A18/1.333	=A18*0.375	=A18*1.3053633	=2*((D18/2)^2-(C18)^2)^0.5	=A18*1.745	=F18/64

**Fig. 8**



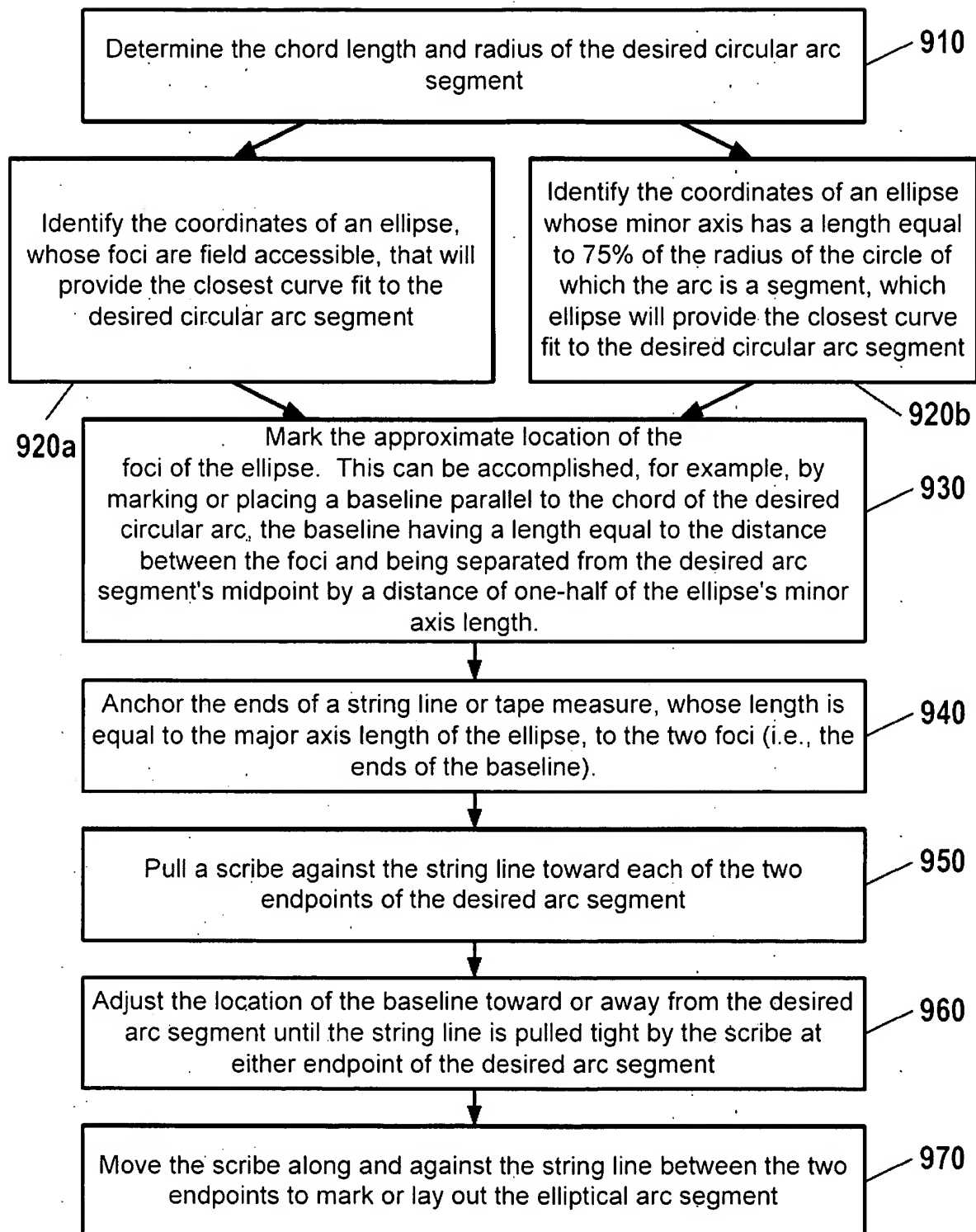


Fig. 9

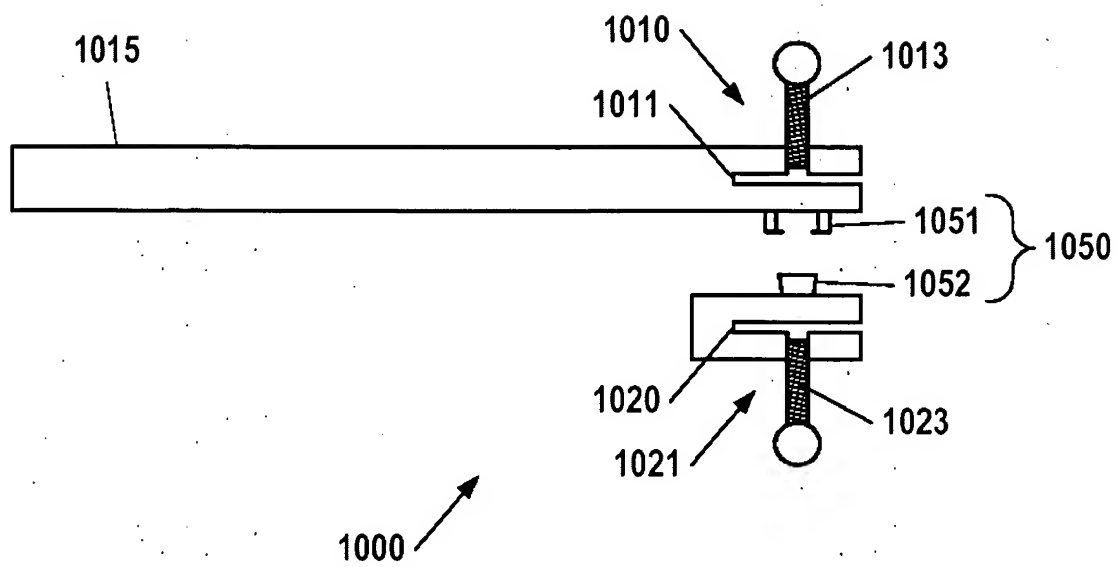


Fig. 10

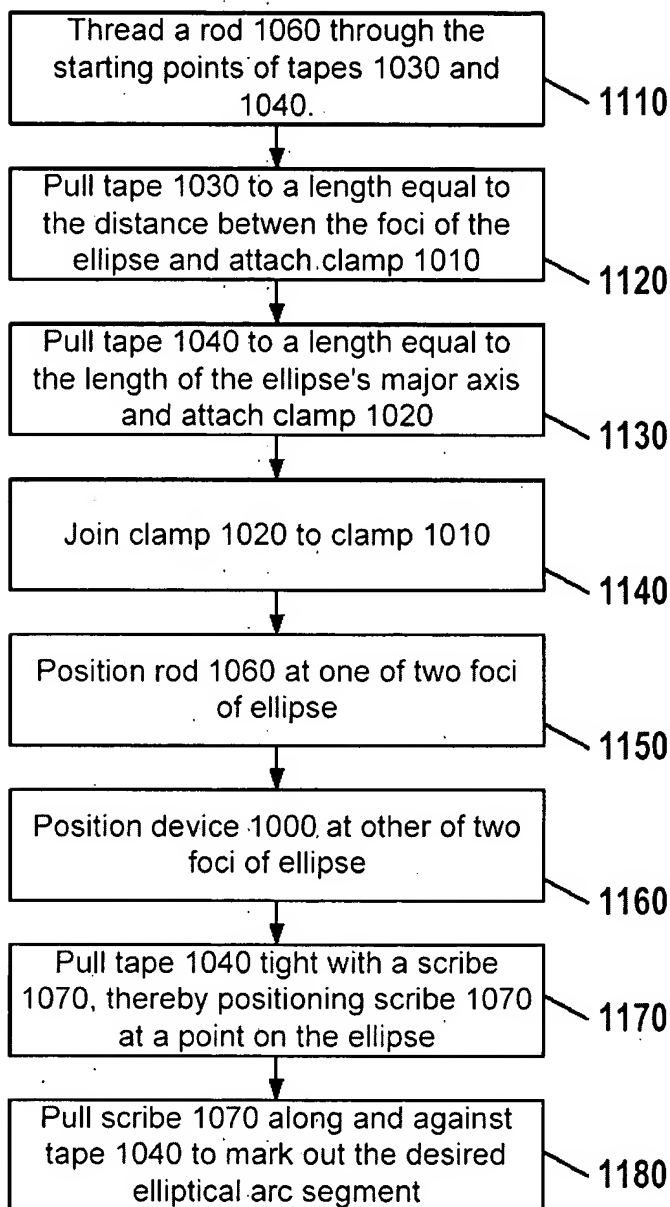


Fig. 11

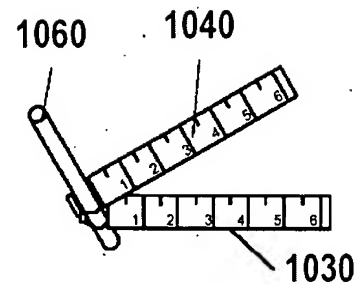


Fig. 12

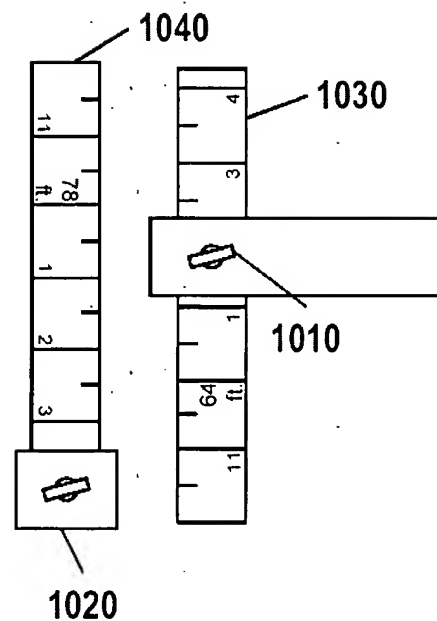


Fig. 13

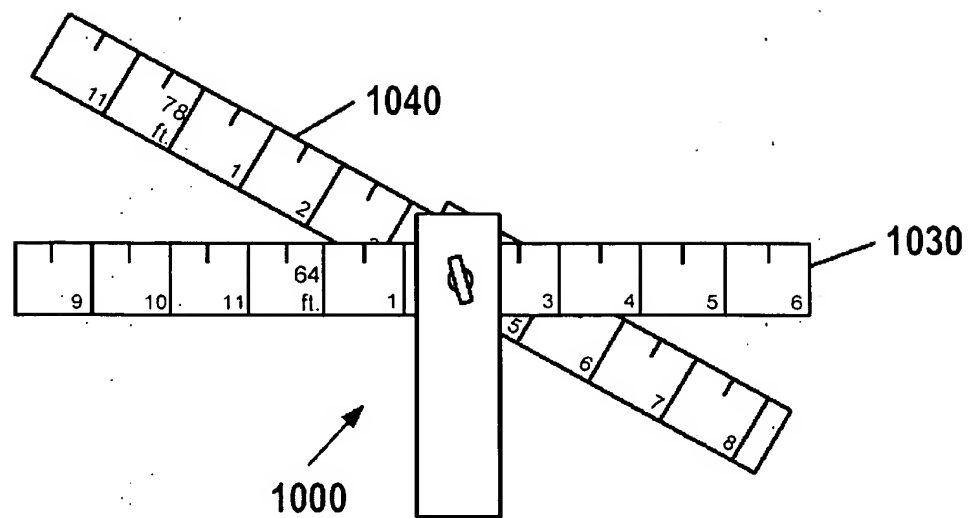


Fig. 14

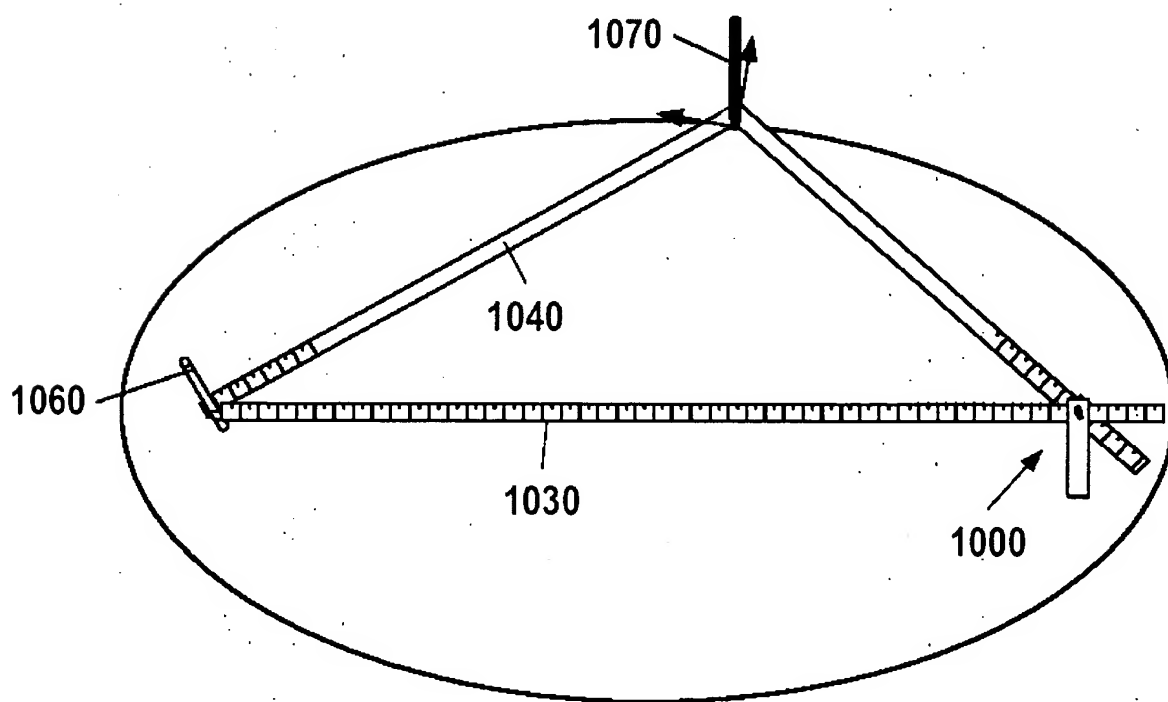


Fig. 15